

**DEPARTMENT OF THE AIR FORCE
AIR FORCE CIVIL ENGINEER CENTER**

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24 January 2017

Ms. Carolyn d'Almeida
U.S. EPA Region IX
75 Hawthorne Street
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and

Mr. Wayne Miller, P.E., R.G.
Arizona Department of Environmental Quality
1110 West Washington Street, 4415B-1
Phoenix, Arizona 85007

Subject: Submission of "Final Field Variance Memorandum #5A – Extraction and Treatment Capture Evaluation, Former Liquid Fuels Storage Area, Site ST012, Former Williams Air Force Base, Mesa, Arizona"

The Air Force is pleased to submit the attached, *Field Variance Memorandum #5A – Extraction and Treatment Capture Evaluation*, in final format for your records. This memorandum details supplemental analysis of the capture zone for the proposed and modified extraction scenarios for construction and operation activities associated with the groundwater extraction and treatment system for containment at the Former Liquid Fuels Storage Area (ST012) located at the former Williams Air Force Base in Mesa, Arizona. If USEPA or ADEQ submits comments on the final version of the document, the Air Force will respond to the comments under separate cover.

Please contact me at (315) 356-0810 or catherine.jerrard@us.af.mil if you have any questions regarding this report.

Sincerely,

A handwritten signature in black ink, appearing to read "Catherine Jerrard".

CATHERINE JERRARD, PE
BRAC Environmental Coordinator

Attachment:

Final Field Variance Memorandum #5A – Extraction and Treatment Capture Evaluation, Former Liquid Fuels Storage Area, Site ST012, Former Williams Air Force Base, Mesa, Arizona

c: ADEQ - Wayne Miller (2 and 2 CD)
Administrative Record – AFCEC/CIBP-BRAC AR (1 and 1 CD)
AFCEC –Catherine Jerrard (1 and 1 CD)
ASU Libraries – Brad Vogus (1 and 1CD)
CNTS – Geoff Watkin (1 and 1 CD)
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USEPA – Carolyn d'Almeida (1 and 1 CD)
USEPA – Eva Davis (1 and 1 CD)
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File

ST012 Remedial Action

Field Variance Memorandum 5A-Supplemental – Extraction and Treatment Capture Evaluation

Date: 24 January 2017 From: Amec Foster Wheeler Environment & Infrastructure, Inc.

To: Catherine Jerrard (AFCEC)

Cc: Geoff Watkin (CNTS)

Subject: **Proposed Active Containment – Supplemental Hydraulic Analysis
Former Liquid Fuels Storage Area (ST012)
Former Williams Air Force Base – Mesa, Arizona**

1.0 INTRODUCTION

Field Variance Memorandum (Memo) 5 was prepared as a variance to Draft Final Addendum 2 to the Remedial Design and Remedial Action Work Plan (RD/RAWP) (Addendum 2) (Amec Foster Wheeler, 2016) and described construction and operation activities for the Addendum 2 groundwater extraction and treatment system at the Former Liquid Fuels Storage Area (ST012) at the former Williams Air Force Base. The groundwater extraction and treatment system will provide active containment for the dissolved phase contaminant plume pending results of further light non-aqueous phase liquid (LNAPL) and dissolved phase plume characterization being addressed under ST012-RA-FVM-4. This memo details supplemental analysis of the capture zone for the proposed and modified extraction scenarios.

2.0 OBJECTIVES

The objective for the construction and operation of the Addendum 2 groundwater extraction and treatment system is to provide containment for the dissolved-phase contaminant plume and recovery of accumulated LNAPL. This supplemental memo describes the approximate distribution of contamination and the hydrogeologic evaluation of groundwater extraction to support containment at ST012. The hydrogeologic evaluation was conducted for the extraction system as presented in FVM 5. In addition, to address well temperatures above the pump limits (175°F) and recent investigations conducted in accordance with FVM4 that indicate contamination is farther north than previously known, a modified extraction system was evaluated.

3.0 TEMPERATURE SURVEY

A temperature survey of the extraction wells was completed to determine current temperature profiles prior to installation of extraction pumps. Temperatures were measured approximately every 10 vertical feet below 130 ft bgs in each extraction well using a portable thermocouple temporarily deployed in each well. In some cases the measured temperatures exceeded the rated temperature limit (175°F) of the extraction pump included in the extraction system design (see FVM5). Temperature screening was also conducted in several additional wells to identify alternate wells that might be suitable from a temperature perspective for extraction. The results of the temperature screening are included in **Attachment 1**, Tables 1, 2, and 3.

4.0 PARTICLE TRACK CAPTURE ANALYSIS

Hydraulic capture was evaluated in a 3D groundwater model using particle tracking and comparing the particle tracks to the extent of contamination. The 3D groundwater model from the original RD/RAWP was used for design consistency, with some parameter updates. The model structure and boundaries as described in the RD/RAWP were unchanged. Extraction wells were included in the model to assess advective flow. Consistent with RD/RAWP Addendum 2, the model was updated with data collected during two previous annual groundwater monitoring events to better represent hydrostatic conditions at ST012 (prior to Steam Enhanced Extraction [SEE] influence).

Particle tracking was performed originating at the upgradient western model boundary to evaluate the flow path and timeframe to reach the extraction points. As with the analysis in Addendum 2, a constant drawdown approach, as opposed to a constant flow rate for each extraction well, was used to approximate the designed level-control systems from groundwater pumping (see descriptions in FVM5).

The following sections detail the relative extent of contamination for evaluation relative to particle tracks, the particle track capture analysis for the extraction system defined in FVM5 and a particle track capture analysis for a modified extraction system.

4.1 Contaminant Distribution for Containment.

Contaminant distribution interpreted to estimate the aerial extent of contamination in each of the primary stratigraphic intervals (Cobble Zone [CZ], Upper Water Bearing Zone [UWBZ], and Lower Saturated Zone [LSZ]). Preliminary data from borings installed in accordance with FVM 4 were considered; however, groundwater sampling data was not yet available. Figures 1, 2, and 3 in **Attachment 2** show the location of wells in each zone and present a qualitative assessment on contaminant presence at each location.

4.2 FVM 5 Groundwater Extraction Well and Pump Network

The groundwater extraction well and pump network for the active containment system presented in FVM5 consists of 22 wells, split across the cobble zone, upper water bearing zone, and lower saturated zone. Figures 3-2, 3-3, and 3-4 included in FVM5 show the well locations for the extraction and monitoring wells

in each of these zones. Additional details for these wells are provided in FVM5. Table 4 below summarizes the FVM5 extraction system and provides the estimated pumping rate for each well.

Table 4 FVM5 Extraction Well Network Summary

Well Identification ⁽¹⁾	Phase Installed	Screened Interval (ft bgs)	Initial Target Pumping Depth (ft bgs) ⁽²⁾	Estimated Pumping Rate (gpm) ⁽³⁾
ST012-CZ18	SEE	145 - 160	155	9.0
ST012-CZ19	SEE	145 - 160	155	5.6
ST012-CZ21	Post-SEE Phase 1	140 - 150	155	5.8
ST012-UWBZ10	SEE	170 - 195	170	3.9
ST012-UWBZ22	SEE	170 - 195	170	1.8
ST012-UWBZ26	SEE	170 - 195	170	1.5
ST012-UWBZ27	SEE	170 - 195	170	0.8
ST012-UWBZ30	Post-SEE Phase 1	171 - 191	170	0.8
ST012-UWBZ31	Post-SEE Phase 1	170 - 190	170	2.3
ST012-LSZ09	SEE	205.5 - 240.5	190	1.6
ST012-LSZ11	SEE	206.4 - 243.4	190	1.5
ST012-LSZ12	SEE	207 - 243	190	3.9
ST012-LSZ14	SEE	204.8 - 239.8	190	0.1
ST012-LSZ17	SEE	206.2 - 241.8	190	6.3
ST012-LSZ23	SEE	210 - 245	190	1.7
ST012-LSZ26	SEE	210 - 245	190	2.3
ST012-LSZ28	SEE	210 - 245	190	6.4
ST012-LSZ29	SEE	210 - 245	190	9.4
ST012-LSZ36	SEE	210 - 245	190	2.4
ST012-LSZ37	SEE	210 - 245	190	1.9
ST012-LSZ38	SEE	210 - 245	190	2
ST012-LSZ39	SEE	210 - 245	190	1.5
Total	-	-	-	72.5

Notes:

ft bgs – feet below ground surface

SEE – steam enhanced extraction

⁽¹⁾ST012-LSZ18 and ST012-LSZ35 were incorrectly identified as part of the extraction well system in Addendum 2, Table 4-2 which will be corrected when the document is finalized. They are not included in the containment extraction wells listed here.

⁽²⁾The approximate initial target depth for water to be maintained in the well during pumping.

⁽³⁾Steady-state flow rate based on the groundwater model and the pumping elevation set points.

Figures 4, 5, and 6 in **Attachment 3** show estimated flow rates and the particle track pathway analysis for the FVM5 extraction system.

4.3 Modified Groundwater Extraction Well and Pump Network

The modified groundwater extraction well and pump network for the active containment system consists of 18 wells including one dual-screened well, split across the CZ, UWBZ, and LSZ. Modifications were implemented to improve capture in the northern portion of the CZ based on contamination observed in that area during implementation of the FVM4 characterization. In addition, modifications were made to pump in alternate wells because some of the originally planned wells had temperatures above the limit of the submersible pumps (175°F). Two wells (ST012-CZ07 and ST012-CZ08) that are above this temperature limit were included on the basis of providing alternate pneumatic pumps that can handle higher temperatures. It was necessary to include pumping in the CZ on the northern perimeter to achieve reasonable capture to the north. These two wells were set at a flow rate of 3.5 gpm each in the model rather than using a set drawdown elevation to reflect the maximum capacity of the high temperature pumps (~4 gpm). Pumping from UWBZ28/LSZ51 was assumed to occur by a single pump with no packer installed between the two screened intervals. Table 5 below summarizes the modified extraction system and provides the estimated pumping rate for each well.

Table 5 Modified Extraction Well Network Summary

Well Identification	Phase Installed	Screened Interval (ft bgs)	Initial Target Pumping Depth (ft bgs) ⁽¹⁾	Estimated Pumping Rate (gpm) ⁽²⁾
ST012-CZ07	SEE	145 – 160	155	3.5
ST012-CZ08	SEE	145 - 160	155	3.5
ST012-CZ18	SEE	145 - 160	155	8.4
ST012-CZ19	SEE	145 - 160	155	5.3
ST012-CZ21	Post-SEE Phase 1	140 - 150	155	5.2
ST012-UWBZ21	SEE	170 - 195	170	1.4
ST012-UWBZ22	SEE	170 - 195	170	1.8
ST012-UWBZ26	SEE	170 - 195	170	1.5
ST012-UWBZ27	SEE	170 - 195	170	3.9
ST012-UWBZ28	Post-SEE Phase 1	170 - 195	170	0.8
ST012-UWBZ30	Post-SEE Phase 1	171 – 191	170	0.7
ST012-LSZ09	SEE	205.5 - 240.5	190	1.8
ST012-LSZ11	SEE	206.4 - 243.4	190	2.3
ST012-LSZ13	SEE	207.5 - 242.5	190	5.6
ST012-LSZ23	SEE	210 - 245	190	1.9

Table 5 Modified Extraction Well Network Summary

Well Identification	Phase Installed	Screened Interval (ft bgs)	Initial Target Pumping Depth (ft bgs) ⁽¹⁾	Estimated Pumping Rate (gpm) ⁽²⁾
ST012-LSZ37	SEE	210 - 245	190	2.1
ST012-LSZ38	SEE	210 - 245	190	2.2
ST012-LSZ39	SEE	210 - 245	190	1.7
ST012-LSZ51	Post SEE Phase 1	210 - 235	170	9.6
Total	-	-	-	63.2

Notes:

ft bgs – feet below ground surface

SEE – steam enhanced extraction

⁽¹⁾The approximate initial target depth for water to be maintained in the well during pumping. Adjustments may be made based on groundwater pathline analysis of capture and observations during operation.

⁽²⁾Steady-state flow rate based on the groundwater model and the pumping elevation set points with the exception of ST012-CZ07 and ST012-CZ08 which were set at 3.5 gpm based on the pump capabilities.

Figures 7, 8, and 9 in **Attachment 4** show estimated flow rates and the particle track pathway analysis for the modified extraction system. The modified extraction system is being implemented to provide a functioning containment system.

5.0 REFERENCES

AMEC, 2014. *Final Remedial Design and Remedial Action Work Plan for Operable Unit 2 Revised Groundwater Remedy, Site ST012, Former Williams Air Force Base, Mesa, Arizona*. Prepared for the Air Force Civil Engineer Center. 20 May 2014. Contract No. FA8903-09-D-8572 – 0002.

Amec Foster Wheeler Environment & Infrastructure Inc. (Amec Foster Wheeler), 2016a. *Draft Final Addendum #2, Remedial Design and Remedial Action Work Plan for Operable Unit 2 Revised Groundwater Remedy, Site ST012, Former Williams Air Force Base, Mesa, Arizona*. Prepared for the Air Force Civil Engineer Center. 15 March 2016. Contract No. FA8903-09-D-8572 – 0002.

Amec Foster Wheeler, 2016b. *Final Field Variance Memorandum 5 – Extraction and Treatment System Construction*, Former Liquid Fuels Storage Area (ST012), Former Williams Air Force Base, Mesa Arizona. Prepared for the Air Force Civil Engineer Center. 1 December 2016. Contract No. FA8903-09-D-8572 – 0002.

ATTACHMENT 1

TEMPERATURE SCREENING MEASUREMENTS

Table 1 - Temperature Screening Measurements in Cobble Zone Wells

Depth (ft. btoc)	CZ13		CZ15		CZ18		CZ19		CZ21			
	11/4/2016		10/21/2016		6/22/2016		10/21/2016		6/22/2016		10/21/2016	
	NRNR	NROR	NRNR	NROR	NRNR	NROR	NRNR	NROR	NRNR	NROR	NRNR	NROR
(ft. btoc)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
10					105.8			101.2				
20					111.1			101.3				
30					112.7			102.3				
40					115.8			103.4				
50					117.6			103.3				
60					118.9			105.5				
70					119.4			105.8				
80					119.6			106				
90					120.2			108.8				
100					122.3			110.1				
110					128.8			113.3				
120					145.6			135.3				
130	187.7	181.7	177.3	170.1	163.3	144.5	143.6	159.1	145.5	141.2	124.3	124.9
140	199.9	193.3	192.3	186.2	174.9	156.1	154.5	164.8	153.3	149.2	134.6	134.5
150	208.7	204	198.7	191.5	170.6	162	160.2	172.1	154.3	149.7	164.7	163.8
160	209.3	205	199.4	192.6	163.8	158.5	156.9	171.6	152.4	146.4	164	161.9
170	209.7	205	201.1	194		157.9	156.3	157.8	152.5	146.1	163.3	162
Overall Average Temp °F	203.1	197.8	193.8	186.9	131.9	155.8	154.3	124.8	151.6	146.5	150.2	149.4
Average in CZ (140-160)	206.0	200.8	196.8	190.1	169.8	158.9	157.2	169.5	153.3	148.4	154.4	153.4

Key:

NRNR: New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates
temperatures above 175 °F

Table 1 - Temperature Screening Measurements in Cobble Zone Wells

Depth (ft. btoc)	CZ07		CZ08		CZ23		CZ09		CZ12	
	12/19/2016		12/19/2016		12/19/2016		12/20/2016		12/20/2016	
	NRNR	NROR	NRNR	NROR	NRNR	NROR	NRNR	NROR	NRNR	NROR
(ft. btoc)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
10										
20										
30										
40										
50										
60										
70										
80										
90										
100										
110										
120										
130	161.9	164.3	162.3	164.4	72.2	72	161.1	153.2	177.2	171.3
140	173.9	176.5	176.1	175	76.8	78.9	185.5	179.4	190	184.5
150	189.5	188	181.4	182.3	82.2	80.2	201.6	195.5	202.9	198.5
160	190.7	190.3	182.8	182.4	84.7	80.5	202.5	196.7	203.7	198.6
170	189.6	189.3	181.4	182.8	84.4	80.5				
Overall Average Temp °F	181.1	181.7	176.8	177.4	80.1	78.4	187.7	181.2	193.5	188.2
Average in CZ (140-160)	184.7	184.9	180.1	179.9	81.2	79.9	196.5	190.5	198.9	193.9

Key:

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Red text indicates
temperatures above 175 °F

Table 1 - Temperature Screening Measurements in Cobble Zone Wells

Depth (ft. btoc)	CZ17		CZ19	
	11/7/2016		11/8/2016	
	NRNR (°F)	NROR (°F)	NRNR (°F)	NROR (°F)
10				
20				
30				
40				
50				
60				
70				
80				
90				
100				
110				
120				
130	138.8	139.8	145.5	141.2
140	160.1	158.6	153.3	149.2
150	171.2	167.8	154.3	149.7
160	165.7	162.6	152.4	146.4
170	165.9	162	152.5	146.1
Overall Average Temp °F	160.3	158.2	151.6	146.5
Average in CZ (140-160)	165.7	163.0	153.3	148.4

Key:

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Red text indicates
temperatures above 175 °F

Table 2 - Temperature Screening Measurements in Upper Water Bearing Zone Wells

Depth (ft. btoc)	UWBZ01		UWBZ02		UWBZ03		UWBZ04	
	11/14/2016		11/14/2016		11/14/2016		11/14/2016	
	NRNR (°F)	NROR (°F)	NRNR (°F)	NROR (°F)	NRNR (°F)	NROR (°F)	NRNR (°F)	NROR (°F)
10								
20								
30								
40								
50								
60								
70								
80								
90								
100								
110								
120								
130	125.9	123.5	162.3	160.3	192.3	190.1	190.7	189.7
140	143.2	140.8	181.7	179.2	201.5	199.3	192.8	190
150	160.7	158.5	194.1	190.1	206.6	204.4	194.2	192.1
160	175.7	173.1	205.3	200.9	213	210.8	196.9	194.5
170	184.9	181.8	211.5	209.7	216.6	214.4	201.7	190.2
180	214.1	212.6	217.2	212.5	218	215.8	213.3	211.3
190	225.4	223.1	224.2	220.7	220.2	218	225.4	222.1
Overall Average Temp °F	175.7	173.3	199.5	196.2	209.7	207.5	202.1	198.6
Average in UWBZ (160-190)	200	198	215	211	217	215	209	205

Key:

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NROR: New Reel, Old Reader

Red text indicates temperatures
above 175 °F

Table 2 - Temperature Screening Measurements in Upper Water Bearing Zone Wells

Depth (ft. btoc)	UWBZ05		UWBZ06		UWBZ07		UWBZ09	
	11/4/2016		11/1/2016		11/14/2016		11/16/2016	
	NRNR (°F)	NROR (°F)	NRNR (°F)	NROR (°F)	NRNR (°F)	NROR (°F)	NRNR (°F)	NROR (°F)
10								
20								
30								
40								
50								
60								
70								
80								
90								
100								
110								
120								
130	190.4	186.6	174.9	169.3	194.6	192.1	126.7	124.1
140	194.4	192.4	185.2	180.2	203.8	200.1	133.1	132.4
150	208.3	205	192	186	208.9	205.3	144.3	140.1
160	220.9	218	201.1	197	215.3	210.7	152.7	150.7
170	224.4	221	220.6	215	218.9	215.3	177.1	175.3
180	228.9	226	226.8	223	220.3	219.4	201.3	198.2
190	232.9	230	232.1	226	222.5	220.3	208.7	205.3
Overall Average Temp °F	214.3	211.3	204.7	199.5	212.0	209.0	163.4	160.9
Average in UWBZ (160-190)	227	224	220	215	219	216	185	182

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Table 2 - Temperature Screening Measurements in Upper Water Bearing Zone Wells

Depth (ft. btoc)	UWBZ12		UWBZ10				UWBZ16		UWBZ17	
	11/16/2016		5/20/2016	6/22/2016	10/21/2016		11/14/2016		12/19/2016	
	NRNR	NROR			NRNR	NROR	NRNR	NROR	NRNR	NROR
10			98.8	109.3						
20			109.2	112.6						
30			121.5	121.2						
40			126.9	130.5						
50			126.5	130.8						
60			125.8	125.4						
70			121.3	121.5						
80			117.9	120.2						
90			115.3	116.2						
100			113.9	120.8						
110			117.1	142						
120			127.8	151.9						
130	136.2	134.3	157.1	159.1	175.8	171	133.4	131.8	156.9	156.4
140	139.2	135.3	161.2	179.8	184	180.5	145.8	144.1	164.7	167.7
150	150.2	133.2	170.2	197.2	204.6	201.5	163.5	160.7	188.5	189.3
160	168.4	167.2	197.4	204.7	205.6	202.7	180.1	178.5	193.6	193.7
170	187.4	180.5	200.5	208.2	210.1	206.5	193.7	191.2	198.7	198.9
180	202.6	195.7	214.0	211.6	214.3	211.8	212.9	200.9	198.4	200.5
190	215.4	205.3	216.1	213.3	217.5	214.8	217.4	215.3	201.4	199.6
Overall Average Temp °F	171.3	164.5	144.1	151.4	201.7	198.4	178.1	174.6	186.0	186.6
Average in UWBZ (160-190)	193	187	207.0	209.45	211.875	209	201	196	198	198.2

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Table 2 - Temperature Screening Measurements in Upper Water Bearing Zone Wells

Depth (ft. btoc)	UWBZ19		UWBZ20		UWBZ21		UWBZ22					
	11/14/2016		11/2/2016		11/16/2016		5/19/2016	7/7/2016	10/21/2016		11/14/2016	
	NRNR	NROR	NRNR	NROR	NRNR	NROR			NRNR	NROR	NRNR	NROR
(ft. btoc)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
10							85.64	93.6				
20							87.08	91.6				
30							90.68	92.7				
40							92.12	93.3				
50							92.48	95				
60							93.2	98				
70							93.02	99.1				
80							93.38	99.1				
90							94.1	99.8				
100							93.74	101.6				
110							94.1	107.7				
120							91.04	122.8				
130	117.4	115.5	143.8	140.2	102.7	100.1	124.88	145.4	147	145.3	98.3	96.3
140	134.5	132.1	157.3	153.7	104.7	100.7	127.04	154.5	155.8	155.4	109.2	105.4
150	157.6	155.9	155.1	150.2	105.9	102.3	126.86	171.6	164.6	162.9	124.7	120.1
160	183.6	180.2	156.8	153.2	111.7	108.6	168.44	161.6	158.9	157.4	143.3	140.8
170	192.4	190.8	177.6	173.6	120.9	119.7	162.86	159.8	159.4	158.5	154.5	151.2
180	217.1	215.4	182.1	178.2	131.2	128.2	166.82	162.9	162	160.7	162.3	159.7
190	220.1	218.4	187.1	183.1	147.3	137.3		164.7	166.1	164.9	157.3	152.5
Overall Average Temp °F	174.7	172.6	165.7	161.7	117.8	113.8	109.9	121.8	159.1	157.9	135.7	132.3
Average in UWBZ (160-190)	203.3	201.2	175.9	172	128	123	166.04	162.25	161.6	160.4	154.4	151.1

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates temperatures above 175 °F

Table 2 - Temperature Screening Measurements in Upper Water Bearing Zone Wells

Depth (ft. btoc)	UWBZ23		UWBZ24		UWBZ25		UWBZ26		
	11/14/2016		11/7/2016		12/19/2016		7/5/2016	10/21/2016	
	NRNR	NROR	NRNR	NROR	NRNR	NROR		NRNR	NROR
(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
10							78.26		
20							98.06		
30							92.12		
40							95.18		
50							95.72		
60							96.26		
70							96.26		
80							96.44		
90							95.54		
100							95.72		
110							95.54		
120							95.72		
130	112.8	112.8	152.7	143.8	172.4	173.9	95.9	98.5	97.7
140	124.2	124.2	164.9	162.4	188.4	188.5	97.34	98.1	96.8
150	144.6	144.6	166.1	163.7	204	201.6	99.68	106.4	105.4
160	164.7	164.7	170.2	165.8	209.3	207.3	105.44	110.5	109.8
170	178.2	178.2	189.7	187.5	214.6	211	104.9	117.9	116.8
180	206.1	206.1	194.4	192.1	215.5	214	105.98	123.8	123.4
190	210.5	210.5	198.8	196.8	211.1	209.6	138.92	129.9	129.5
Overall Average Temp °F	163.0	163.0	176.7	173.2	202.2	200.8	98.9	112.2	111.3
Average in UWBZ (160-190)	190	190	188	186	212.6	210.5	113.81	120.525	119.9

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates temperatures above 175 °F

Table 2 - Temperature Screening Measurements in Upper Water Bearing Zone Wells

Depth (ft. btoc)	UWBZ27				UWBZ28/LSZ51				UWBZ29			
	5/17/2016	7/1/2016	10/21/2016		6/9/2016	11/4/2016			6/9/2016	11/16/2016		6/17/2016
				NRNR NROR	NA	NRNR	NROR	(°F)	NA	NRNR	NROR	(°F)
10	82.04	87.6				98.96				90.5		90.70
20	82.94	89.4				93.38				92.3		90.40
30	88.7	94.7				93.56				91.76		93.50
40	92.84	98.1				93.38				91.58		94.60
50	98.06	100.1				92.48				91.4		94.10
60	100.94	102.3				89.78				93.56		94.60
70	101.84	101.5				90.32				94.1		93.30
80	101.48	101.2				91.04	144.8	140.5		94.46		93.60
90	101.48	100.8				91.58	152.1	148.4		94.82		92.90
100	100.76	99.9				92.66	153.4	153.4		97.7		93.80
110	100.04	98.9				100.94	157	154.1		108.68		95.10
120	100.76	97.9				124.34	162.1	159.7		134.24		103.00
130	102.74	97.1	97.1	94.8		154.76	164.1	161.3		167.36	136.1	134.3
140	103.82	96.4	95.8	94.3		166.46	164.2	161.4		193.46	138.2	136.2
150	104.54	104.9	108	106.3		165.38	164.5	161.9		212.18	140.3	138.1
160	181.76	109.7	113.3	111.3		161.96	165.7	163.2		217.4	149.7	148.7
170	181.58	117.1	119.4	120.3		160.88	165.5	162.8		222.8	150.3	145.2
180	161.06	125.7	127.7	127.3			164.2	161		228.74	161.7	151.3
190	158.72	131.5	128.2	127						232.52	191.2	189.2
Overall Average Temp °F	113.0	102.9	112.8	111.6		115.4	159.8	157.1		139.5	152.5	149.0
Average in UWBZ (160-190)	170.78	121	122.15	121.5		161.42	165.1333	162.3333		225	163	159
												129.13

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates temperatures above 175 °F

Table 2 - Temperature Screening Measurements in Upper Water Bearing Zone Wells

Depth (ft. btoc)	UWBZ31		UWBZ35	
	6/18/2016	10/21/2016	11/4/2016	
	NRNR	NROR	NRNR	NROR
10	97.34			
20	93.20			
30	91.04			
40	91.22			
50	89.96			
60	89.24			
70	89.42			
80	89.96			
90	90.14			
100	91.58			
110	93.38			
120	109.76			
130	137.66	178.8	170.2	85.8
140	155.66	190.9	188.8	85.1
150	165.20	192.7	190.7	82.8
160	158.18	195.8	193.2	83.1
170		196.4	195.5	84.2
180		198	196.2	89
190		197.8	196.2	100.4
Overall Average Temp °F	108.3	192.9	190.1	87.2
Average in UWBZ (160-190)	158.18	197	195.3	89.175
				86.225

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates temperatures above 175 °F

Table 3 - Temperature Screening Measurements in Lower Saturated Zone Wells

Depth (ft. btoc)	LSZ01		LSZ03		LSZ04		LSZ05		LSZ06	
	11/2/2016		11/14/2016		11/4/2016		11/4/2016		10/31/2016	
	NRNR	NROR	NRNR	NROR	NRNR	NROR	NRNR	NROR	NRNR	NROR
10										
20										
30										
40										
50										
60										
70										
80										
90										
100										
110										
120										
130	182.3	180.1	172.1	170.8	207.9	204	199.2	193.9	144.7	136.4
140	202.8	199.3	177.6	171.3	210.3	205	208.7	207	160.9	154.2
150	208.2	204	185.9	180.4	217.3	210	218.1	216	178	171.8
160	215.3	211	195.8	191.3	221.7	218	227.2	225	204.6	199.4
170	221.3	217	203.7	200.7	233.2	232	231.8	228	212.4	208
180	226.2	223	210.1	205.3	237.2	237	235.5	233	217.9	214
190	234.1	230	218.8	215.7	241.9	239	240.7	236	225.8	222
200	237.5	233	228.7	225.2	243	244	244.1	241	229.8	226
210	234.6	231	231.5	228.8	246	245	247.2	245	240	236
220	226.4	223	236.1	234.1	221.3	220	231.8	230	241.7	239
230	203.7	201	237.8	235.2	204.1	205	218.7	215	239	236
240									240	239
Overall Average Temp °F	217.5	213.9	208.9	205.3	225.8	223.5	227.5	224.5	211.2	206.8
Average in LSZ (200-240)	225.6	222.0	233.5	230.8	228.6	228.5	235.5	232.8	238.1	235.2

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates

temperatures above 175 °F

Table 3 - Temperature Screening Measurements in Lower Saturated Zone Wells

Depth (ft. btoc)	LSZ08		LSZ09		LSZ11				
	11/4/2016		7/1/2016	10/19/2016	5/19/2016	7/1/2016	10/19/2016		
	NRNR	NROR	NRNR	NROR	NRNR	NROR			
10			110.4		102.2	86.8			
20			125.9		103.28	86.3			
30			131.9		103.64	86			
40			133.6		105.08	86.1			
50			134.9		105.44	86.4			
60			136.7		105.98	87			
70			127.2		105.98	86.3			
80			126.1		105.08	86.9			
90			126.5		105.08	87.2			
100			125.7		105.26	87.6			
110			124.1		105.44	90.9			
120			122		105.62	103.4			
130	90.9	86.5	117.6	110.1	105.9	106.16	125.3	126.4	125.2
140	93.2	88.3	118.4	105.4	101.5	105.8	141.7	135.6	136.3
150	100.2	95.4	123.1	116.0	111.9	159.26	143.6	137.1	137.5
160	115.9	111.3	133.8	122.0	119.3	155.48	125.6	129.1	129.8
170	120.7	116.7	147.7	130.5	127.3	149.72	124.1	133.3	131.3
180	128	123.9	158.1	142.6	139.0	145.94	130.1	137.7	137.3
190	135.1	130.2	134	155.6	151.9	145.94	136.4	145.7	144.5
200	142.3	137.5	136.4	168.9	165.1	142.88	140	154.3	152.7
210	145.8	141.6		175.1	172.6			161.7	160.0
220	145.8	141.5		177.8	174.9			164.4	163.7
230	137.9	133.3		164.2	161.7			139.5	140.3
240									
Overall Average Temp °F	123.3	118.7	129.7	142.6	139.2	118.5	106.4	142.3	141.7
Average in LSZ (200-240)	143.0	138.5	136.4	171.5	168.6	142.9	140.0	155.0	154.2

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates

temperatures above 175 °F

Table 3 - Temperature Screening Measurements in Lower Saturated Zone Wells

Depth (ft. btoc)	LSZ12				LSZ13		LSZ14				
	5/18/2016	7/1/2016	10/19/2016		NRNR	NROR	NRNR	NROR	5/17/2016	7/1/2016	10/19/2016
	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
10	83.48	91.7							95.36	96.2	
20	85.28	90.5							96.08	89.8	
30	86.18	88.8							96.98	90.2	
40	87.08	89.4							97.34	91.6	
50	88.34	90.4							97.7	92.1	
60	87.98	90.8							97.88	92.2	
70	89.24	90.5							98.06	93.1	
80	89.06	90.7							98.78	92.7	
90	89.6	90.9							98.96	92.8	
100	90.32	91.8							98.6	92.4	
110	91.22	95.7							98.96	92.7	
120	95.54	110.3							106.34	93.1	
130	105.44	124.3	137.1	134.5	149	139.8	109.58	94.2	102.2	96.8	
140	159.8	147.1	141.1	143.5	159	152.8	149.9	96.4	103.0	101.9	
150	161.42	155.6	147.9	147.6	163.5	156.6	152.78	109.1	138.7	136.0	
160	156.38	142.3	143.8	143.5	170.7	164.4	160.16	113.6	143.7	141.7	
170	133.7	144.5	147.9	147.2	187.1	181	184.1	151.3	154.1	151.1	
180	136.4	150.1	153.3	153.0	195.9	190.8	186.08	162.5	165.6	161.9	
190	139.28	156.7	163.6	162.0	203.4	199.4	189.32	106.1	177.0	178.7	
200	144.14	160.8	173.2	172.9	210.5	206	191.66	106.4	188.9	186.6	
210			184.4	179.8	215.7	211			197.2	196.5	
220			188.2	184.1	216.6	212			201.0	201.4	
230			176.2	174.8	204.3	199.8			200.2	198.7	
240											
Overall Average Temp °F	110.0	114.6	159.7	158.4	188.7	183.1	125.2	102.4	161.1	159.2	
Average in LSZ (200-240)	144.1	160.8	180.5	177.9	211.8	207.2	191.7	106.4	196.8	195.8	

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates

temperatures above 175 °F

Table 3 - Temperature Screening Measurements in Lower Saturated Zone Wells

Depth (ft. btoc)	LSZ15		LSZ16		LSZ17				LSZ18	
	11/14/2016		11/1/2016		5/20/2016	6/23/2016	10/19/2016		11/14/2016	
	NRNR	NROR	NRNR	NROR			NRNR	NROR	NRNR	NROR
10					100.8	93.56				
20					99.2	83.48				
30					99.3	85.1				
40					100.9	90.14				
50					101.4	95.9				
60					101.8	96.44				
70					101.5	94.64				
80					101.3	97.7				
90					103.2	97.52				
100					104.5	102.56				
110					114.3	118.94				
120					136.1	142.34				
130	117.1	116.2	188.3	185.4	160.9	156.9	150.1	153.1	105.6	102.3
140	120.8	118.3	194.1	189.7	177.8	179.1	155.7	160.1	107	105.1
150	122.9	120.1	203.3	200	186.4	173.1	183.8	184.3	111.3	109
160	138.3	134.5	211.4	208	189.6	177.8	188.9	190.0	115.7	114.2
170	142.7	140.1	218.7	216	195.4	201.4	196.1	197.2	125.3	126.2
180	158.9	155.3	225.9	222	201.6	205.2	201.8	203.7	138.4	131.4
190	167.3	162.7	230.7	226	209.1	210.7	207.4	210.1	149.7	145.3
200	171.3	168.3	236.7	233	216.7	213.1	215.8	215.1	161.3	157.2
210	192.7	181.3	235.8	229			218.1	219.1	182.1	171.4
220	182.5	180.7	229.9	225.3			218.0	219.4	190.7	181.3
230	174.3	174	235.7	230.9			204.8	205.4	208.7	201.3
240										
Overall Average Temp °F	153.5	150.1	219.1	215.0	140.1	135.8	194.6	196.1	145.1	140.4
Average in LSZ (200-240)	180.2	176.1	234.5	229.6	216.7	213.1	214.2	214.8	185.7	177.8

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates

temperatures above 175 °F

Table 3 - Temperature Screening Measurements in Lower Saturated Zone Wells

Depth (ft. btoc)	LSZ19		LSZ22		LSZ23		LSZ25	
	11/14/2016		11/14/2016		5/23/2016		10/21/2016	
	NRNR	NROR	NRNR	NROR	NRNR	NROR	NRNR	NROR
10					105.26			
20					122.9			
30					127.76			
40					128.84			
50					129.56			
60					131.18			
70					131.36			
80					132.8			
90					131			
100					130.1			
110					127.76			
120					124.34			
130	110.2	109.1	105.3	100.3	121.5	104.0	102.6	142.3
140	113.3	111.3	110.2	107.2	115.3	100.3	99.3	148.5
150	121.4	120	113.6	110.7	117.1	110.1	109.3	161.2
160	128.9	124.2	124.6	120.3	123.3	116.0	115.9	179.3
170	137.4	135.5	165.02	162.4	134.2	125.5	123.7	188.7
180	148.3	141.2	172.5	170.3	147.2	138.2	138.0	201.3
190	157.5	156.2	183.4	180.9	165.6	150.9	150.2	213.2
200	161.7	159.3	194.36	190.3	178.9	166.3	163.2	224.74
210	181.2	171.2	204.9	200.7		176.1	173.3	228.3
220	187.3	185.3	214.9	210.1		178.9	176.2	231.4
230	189.7	187.2	220.3	219.8		151.4	148.3	239.3
240								
Overall Average Temp °F	148.8	145.5	164.5	161.2	131.3	138.0	136.4	196.2
Average in LSZ (200-240)	180.0	175.8	208.6	205.2	178.9	168.2	165.3	230.9
								224.0

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates

temperatures above 175 °F

Table 3 - Temperature Screening Measurements in Lower Saturated Zone Wells

Depth (ft. btoc)	LSZ26				LSZ27		LSZ28				
	5/16/2016	7/6/2016	10/19/2016		NRNR	NROR	11/14/2016	5/20/2016	6/23/2016	7/6/2016	10/19/2016
	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
10	95.9	111.4					100.04	98.8	96.9		
20	105.26	109.4					104.36	102.1	100.2		
30	108.68	112.6					113.54	116.2	108.3		
40	111.56	114.7					120.56	123.9	115.6		
50	113	116.4					125.78	125.3	120.2		
60	115.34	118.8					120.2	121.3	121.1		
70	116.96	118.9					117.5	117	117.7		
80	118.04	119.4					115.16	113.8	114		
90	119.66	120.9					112.82	110.8	111.4		
100	119.3	123.7					108.86	111.8	111.5		
110	121.46	134.6					106.88	121	120.6		
120	131.9	154.2					109.76	141.7	142.3		
130	152.4	168.2	151.3	148.2	87.9	86.3	112.1	166.6	168.7	172.2	172.9
140	171.1	168.3	161.5	157.9	91.2	90.3	115.0	187.7	186.3	189.3	190.1
150	174.2	164.5	166.3	163.7	107.3	102.7	118.0	203.1	203.3	209.7	208.4
160	174.4	168.3	169.2	164.1	115.3	113.3	118.0	206.3	206.8	213.5	210.2
170	164.5	175.5	172.0	167.5	120.9	119.2	124.2	209.7	210.2	215.5	214.5
180	174.6	187.7	176.5	174.8	131.3	129.2	116.1	214.8	214.5	218.6	218.0
190	182.3	188.1	186.9	182.9	142.7	140.7	113.4	219.4	218.8	221.0	219.3
200	190.9	193.1	195.2	192.9	147.8	146.1	109.6	223.4	221.6	222.6	222.5
210			200.7	200.2	161.3	159.1				220.7	219.0
220			205.1	203.1	168.7	163.8				199.6	198.2
230			183.8	182.7	179.2	171.3				170.7	169.6
240											
Overall Average Temp °F	138.1	143.4	179.0	176.2	132.1	129.3	114.1	151.7	150.5	204.9	203.9
Average in LSZ (200-240)	190.9	193.1	196.2	194.7	164.3	160.1	109.6	223.4	221.6	203.4	202.3

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates

temperatures above 175 °F

Table 3 - Temperature Screening Measurements in Lower Saturated Zone Wells

Depth (ft. btoc)	LSZ29				LSZ30		LSZ32		LSZ33		LSZ34	
	5/17/2016	7/6/2016	10/19/2016		11/4/2016		11/14/2016		11/7/2016		11/14/2016	
			NRNR	NROR	NRNR	NROR	NRNR	NROR	NRNR	NROR	NRNR	NROR
10	93.38	98.6										
20	93.02	95.3										
30	93.2	95.7										
40	103.1	96.4										
50	96.08	95										
60	94.28	95.2										
70	92.84	94.2										
80	95.18	94.8										
90	100.94	93.8										
100	109.22	93.6										
110	110.48	93.3										
120	119.66	94.1										
130	117.7	97.5	94.9	97.6	121.8	114.0	108.9	107.1	89.5	89.7	110.8	108.2
140	118.6	145.9	108.3	109.6	130.9	122.3	113.2	110	96.2	96.7	121.3	119.7
150	134.2	153.9	155.1	152.5	146.8	128.3	126.7	120.2	106.7	106.3	138.2	135.3
160	142.5	165.7	163.5	164.5	159.0	138.7	159.2	157.3	112.6	112.0	151.3	146.7
170	162.5	179.2	173.5	174.8	170.3	150.8	173.8	162.4	119.6	119.0	168.7	160.2
180	174.7	193.3	185.7	185.8	182.7	159.3	187.1	171.2	154.3	151.9	179.2	175.1
190	175.1	196.9	194.1	196.6	191.4	175.4	199	198.1	167.1	165.3	210.3	208.3
200	178.9	200.2	202.9	204.1	214.0	184.6	208.3	205.3	181.4	178.8	213.3	210.2
210			211.8	213.2	215.9	206.0	211.1	210	190.7	187.8	221.2	219
220			212.7	212.6	216.1	209.0	221.2	219.4	195.4	192.4	223.8	220.1
230			188.9	192.6		203.0	223.4	221.2	193.8	190.2	227.3	225.3
240												
Overall Average Temp °F	120.3	123.6	171.9	173.1	174.9	162.9	175.6	171.1	146.1	144.6	178.7	175.3
Average in LSZ (200-240)	178.9	200.2	204.1	205.6	215.3	200.7	216.0	214.0	190.3	187.3	221.4	218.7

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates

temperatures above 175 °F

Table 3 - Temperature Screening Measurements in Lower Saturated Zone Wells

Depth (ft. btoc)	LSZ36				LSZ37			
	5/18/2016	7/7/2016	10/19/2016	NRNR	5/20/2016	6/30/2016	10/19/2016	NRNR
	(°F)	(°F)	(°F)	NROR	(°F)	(°F)	(°F)	(°F)
10	88.16	90.3			100.58	90.1		
20	88.7	87.6			100.04	95.4		
30	89.6	86.8			99.86	96.6		
40	90.86	87.2			99.14	96.2		
50	91.22	86.9			98.96	96		
60	91.94	87.6			98.96	95.9		
70	91.76	87.8			98.78	96.3		
80	91.94	88.1			99.5	96.4		
90	91.76	88			95.54	96.8		
100	93.38	89.4			94.1	96.9		
110	95	95.3			94.82	95.2		
120	103.28	114			94.64	95.7		
130	125.1	130.5	133.7	128.0	94.8	96.1	87.9	85.4
140	167.9	137.0	142.9	146.4	95.0	96.4	86.9	83.7
150	167.9	153.1	149.1	150.5	101.3	96.8	91.0	87.6
160	153.5	139.0	142.7	145.6	101.5	97.7	92.8	90.9
170	169.7	142.9	147.0	149.4	101.7	95.7	96.8	94.6
180	174.6	149.9	156.4	156.2	112.8	94.8	103.5	100.8
190	174.4	158.8	173.8	176.2	168.1	91.2	109.9	107.5
200	176.0	163.9	182.3	183.9	114.4	97.1	116.4	113.6
210			186.6	186.9			120.3	117.7
220			185.8	187.1			114.5	111.5
230			-	-			111.4	108.5
240								
Overall Average Temp °F	120.8	113.2	160.0	161.0	103.2	95.7	102.9	100.2
Average in LSZ (200-240)	176.0	163.9	184.9	186.0	114.4	97.1	115.7	112.8

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates

temperatures above 175 °F

Table 3 - Temperature Screening Measurements in Lower Saturated Zone Wells

Depth (ft. btoc)	LSZ38				LSZ39				LSZ41	
	5/13/2016	6/23/2016	10/19/2016		5/19/2016	6/23/2016	10/19/2016		11/14/2016	
			NRNR	NROR			NRNR	NROR	NRNR	NROR
10	106.34	101.4			78.8	94.1				
20	106.16	94.6			80.96	91.4				
30	105.98	93.3			84.92	92.1				
40	105.8	93.1			85.64	92.5				
50	105.26	93			86.18	92.4				
60	105.8	92.8			87.08	92				
70	106.7	92.4			86.36	92.1				
80	107.06	92.4			87.08	92.6				
90	103.1	92			86.9	92.4				
100	103.46	91.6			86.36	92.1				
110	102.2	91.2			86.36	91.8				
120	100.94	90.7			87.98	91.4				
130	100.4	90.1	89.5	86.9	85.8	91.6	89.0	86.5	177.3	175.1
140	99.5	89.7	89.4	86.5	89.1	95.3	88.1	86.1	180.8	178.8
150	99.0	100.4	101.0	98.7	91.0	104.5	98.6	96.5	184.8	182.5
160	98.1	103.4	105.9	103.4	94.6	112.2	102.4	100.0	190.8	188.8
170	97.7	111.8	112.8	110.4	96.3	122.7	108.8	106.9	198.3	196.3
180	97.3	122.5	123.2	120.2	97.0	134.4	116.8	115.4	206.2	204.2
190	97.5	136.0	134.3	132.6	97.2	143.2	127.2	126.8	213.6	211.5
200	97.3	147.3	144.2	142.4	98.2		136.5	134.9	229.7	227.3
210			152.3	150.9			141.7	140.3	232.5	230.5
220			155.7	154.4			141.8	140.8	211.1	209.1
230			144.3	142.7			109.8	108.2	198.2	196.2
240										
Overall Average Temp °F	102.3	101.0	123.0	120.8	88.7	100.6	114.6	112.9	202.1	200.0
Average in LSZ (200-240)	97.3	147.3	149.1	147.6	98.2	#DIV/0!	132.5	131.1	217.9	215.8

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates

temperatures above 175 °F

Table 3 - Temperature Screening Measurements in Lower Saturated Zone Wells

Depth (ft. btoc)	LSZ42		LSZ43			LSZ44	UWBZ32/LSZ47		
	11/16/2016		12/8/2016	12/19/2016		6/8/2016	6/8/2016	11/1/2016	
	NRNR	NROR	NA	NRNR	NROR	NA	NA	NRNR	NROR
10			94.28			90.86	91.4		
20			99.86			95.18	87.8		
30			105.08			89.6	86.72		
40			107.42			89.78	86.18		
50			107.06			89.42	86		
60			106.88			89.24	85.64		
70			107.06			88.7	85.64		
80			107.78			88.7	85.64		
90			107.24			88.34	85.64		
100			111.74			88.16	85.64		
110			124.16			87.62	85.46		
120			146.84			87.08	85.46		
130	110.2	107.3	172.94	169.7	168	86.9	85.46		83
140	115.7	112.2	191.3	182.1	181.1	86.9	85.28	91.6	84.7
150	120.3	119.3	202.64	197.7	197.6	87.08	84.92	99.3	93
160	128.4	128.9	196.34	211.7	209.1	86.54	84.56	107.4	101.3
170	135.6	131.2	216.14	219.6	218.2	86.9	84.56	119.4	113.1
180	141.7	139.3	224.06	223.7	222.1	86.9	84.38	125.7	120.4
190	152.3	150.1	229.28	223.8	221.6	86.36	84.38	130.1	123.7
200	161.7	157.3	232.7	213.3	212.2	86	84.2	135.9	130.5
210	182.3	179.1		193.2	191			140.5	135.1
220	199.7	182.7		187	184.5			142	136.7
230	212	200.1		181.3	177.9			139.4	134.1
240								145.39	
Overall Average Temp °F	150.9	146.1	149.5	200.3	198.5	88.3	85.7	123.1	114.1
Average in LSZ (200-240)	188.9	179.8	232.7	193.7	191.4	86.0	84.2	140.6	134.1

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates

temperatures above 175 °F

Table 3 - Temperature Screening Measurements in Lower Saturated Zone Wells

Depth (ft. btoc)	UWBZ33/LSZ48			LSZ49	LSZ50	LSZ51	
	6/9/2016	11/1/2016		6/8/2016	6/9/2016	11/4/2016	
	NA	NRNR	NROR	NA	NA	NRNR	NROR
10	89.6			90.32	83.84		
20	86			88.16	81.86		
30	84.56			87.26	81.5		
40	84.38			87.08	80.96		
50	84.38			86.54	81.32		
60	84.2			86.18	80.24		
70	84.2			86	80.42		
80	84.02			85.46	80.78		
90	84.2			85.28	81.14		
100	84.2			85.1	81.14		
110	84.02			85.1	81.68		
120	83.84			85.28	82.04		
130	84.2	85.3	81.6	85.1	82.4	144.8	140.5
140	84.2	86.5	82.4	85.46	82.58	152.1	148.4
150	97.88	85.7	81.4	86	83.12	153.4	133.4
160	103.46	85.8	81.5	84.2	81.68	157	154.1
170	112.64	85.5	81.9	84.74	81.68	162.1	159.7
180	123.08	85.4	81.3	85.28	81.86	164.1	161.3
190	145.22	85.4	81.2	83.84	82.4	164.2	161.4
200	166.1	85.4	81	84.38	83.12	164.5	161.9
210		86.1	80.3			165.7	163.2
220		85.7	80.6			165.5	162.8
230		85	80.9			164.2	161
240		84.9					
Overall Average Temp °F	96.7	85.6	81.3	85.8	81.8	159.8	155.2
Average in LSZ (200-240)	166.1	85.4	80.7	84.4	83.1	165.0	162.2

Key:

NRNR:New Reel, New Reader

NROR: New Reel, Old Reader

Red text indicates

temperatures above 175 °F

Table 3 - Temperature Screening Measurements in Lower Saturated Zone Wells

Depth (ft. btoc)	LSZ54		W36	
	12/19/2016		12/19/2016	
	NRNR	NROR	NRNR	NROR
10				
20				
30				
40				
50				
60				
70				
80				
90				
100				
110				
120				
130	84.7	80	108.6	108.7
140	84.4	79.6	120	116.5
150	84.6	79.5	150.7	145.9
160	83.8	78.8	157.2	154.1
170	81.9	78.4	167.7	163.3
180	81.7	77.9	164.9	161.5
190	80	78.1	141.7	139.7
200	81.3	77.8	121.9	119.2
210	81.5	77.2	110.2	107.7
220	80.9	76.9	106.9	104.8
230	81	77.5	97.1	94.9
240			90.8	88.2
Overall Average Temp °F	82.3	78.3	131.5	128.8
Average in LSZ (200-240)	81.2	77.4	105.4	103.0

Key:

NRNR:New Reel, New Reader

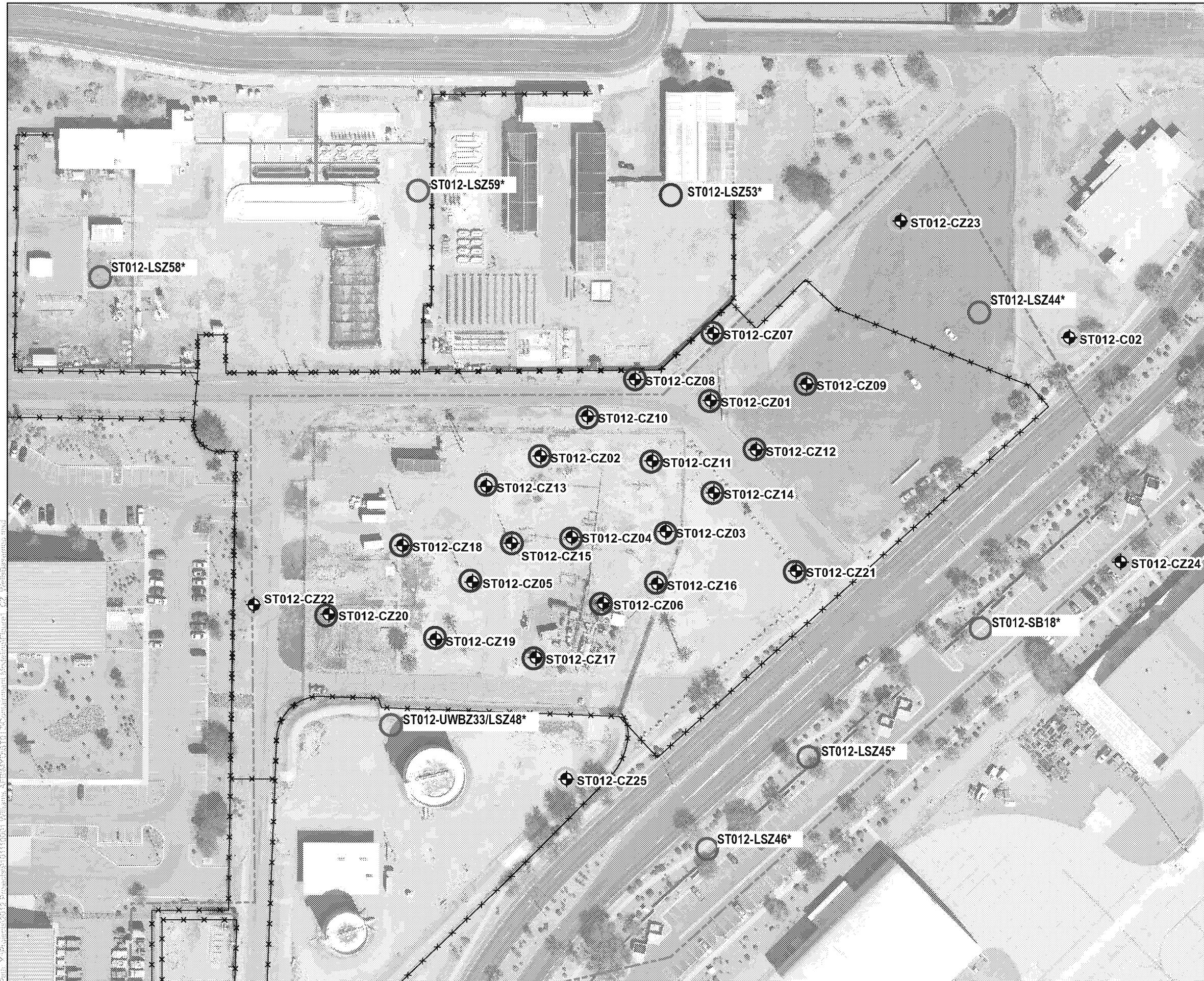
NROR: New Reel, Old Reader

Red text indicates

temperatures above 175 °F

ATTACHMENT 2

WELL LOCATIONS AND CONTAMINANT PRESENCE



Legend

- Cobble Zone Well Location
- Fence Line
- ST012 Site Boundary
- Location of no significant benzene impact (based on most recent data)
- Location of suspected no significant benzene impact
- Location of known benzene impact

*Based on soil core observations in the UWBZ during drilling

Notes:

ST012-CZ23 Well Identification

0 25 50 100
Feet

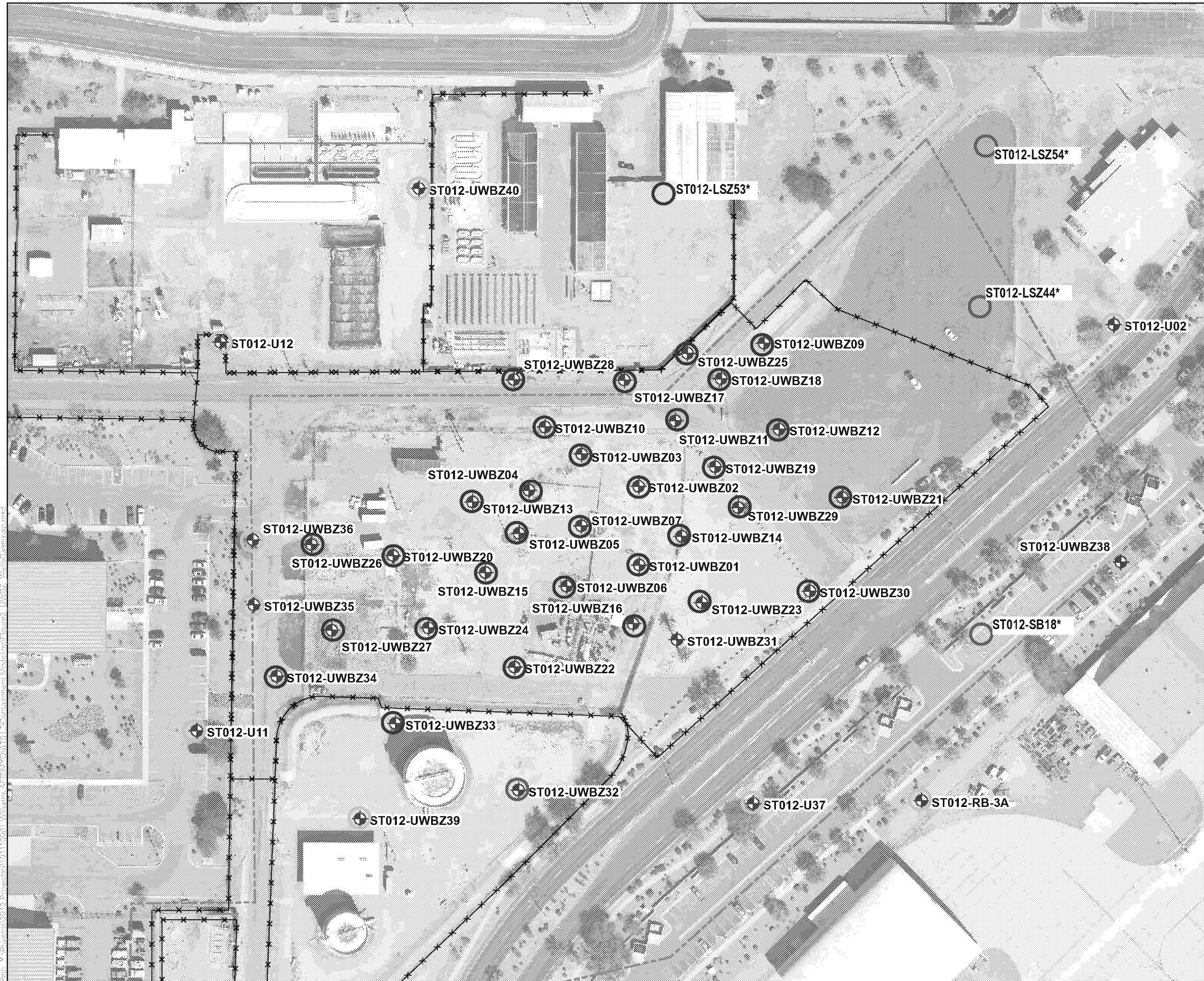


Site ST012 - Former Williams Air Force Base
Mesa, Arizona

Cobble Zone Wells

FIGURE 1	Job No.: 9101110001 PM: DS Date: 1/6/2017 Scale: 1" = 100'	
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Legend

- Upper Water Bearing Zone Well Location
- Fence Line
- ST012 Site Boundary
- Location of no significant benzene impact (based on most recent data)
- Location of suspected no significant benzene impact
- Location of known benzene impact

*Based on soil core observations in the UWBZ during drilling

Notes:

ST012-UWBZ12 Well Identification

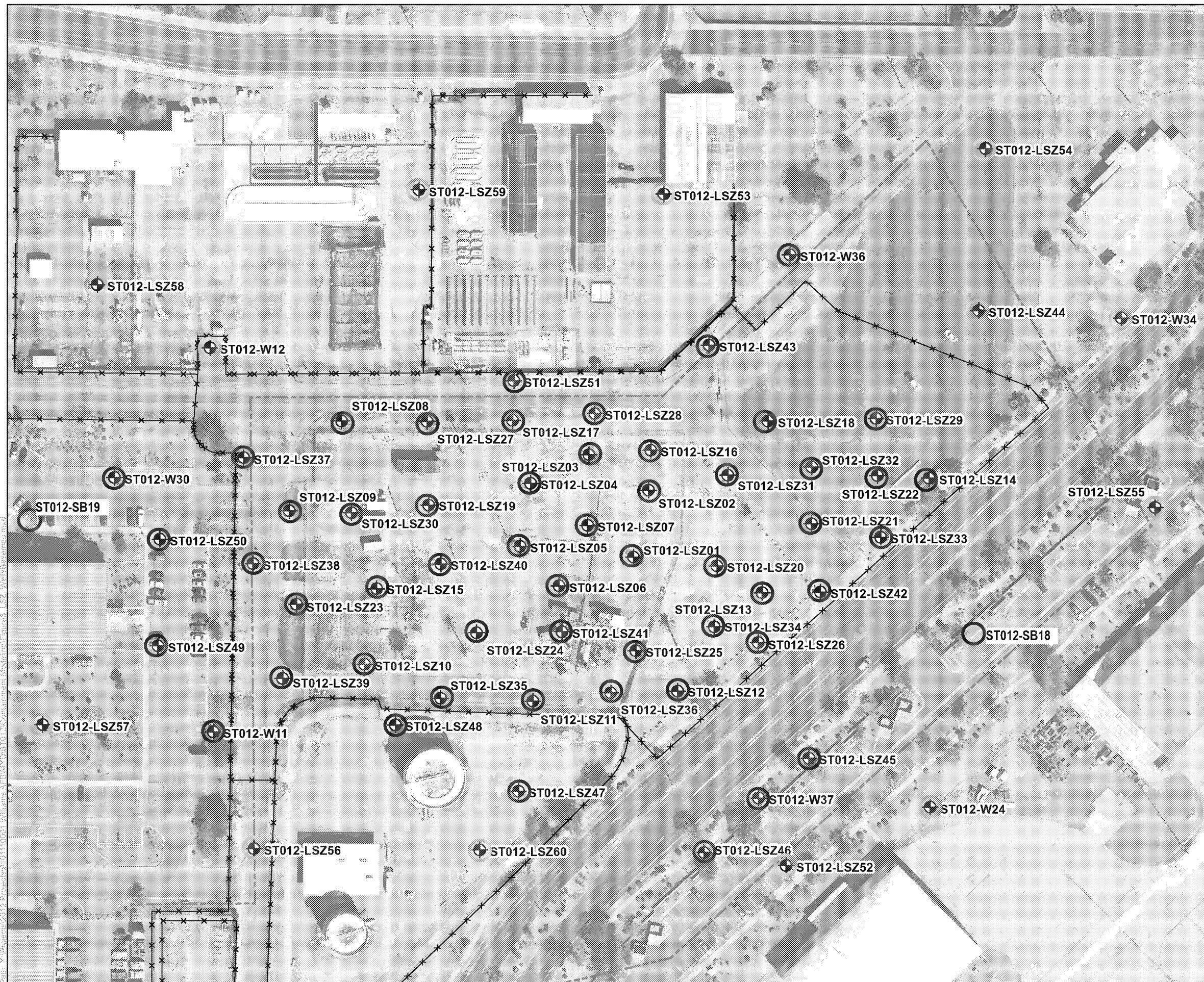
0 25 50 100
Feet

N

Site ST012 - Former Williams Air Force Base
Mesa, Arizona

Upper Water Bearing Zone Wells

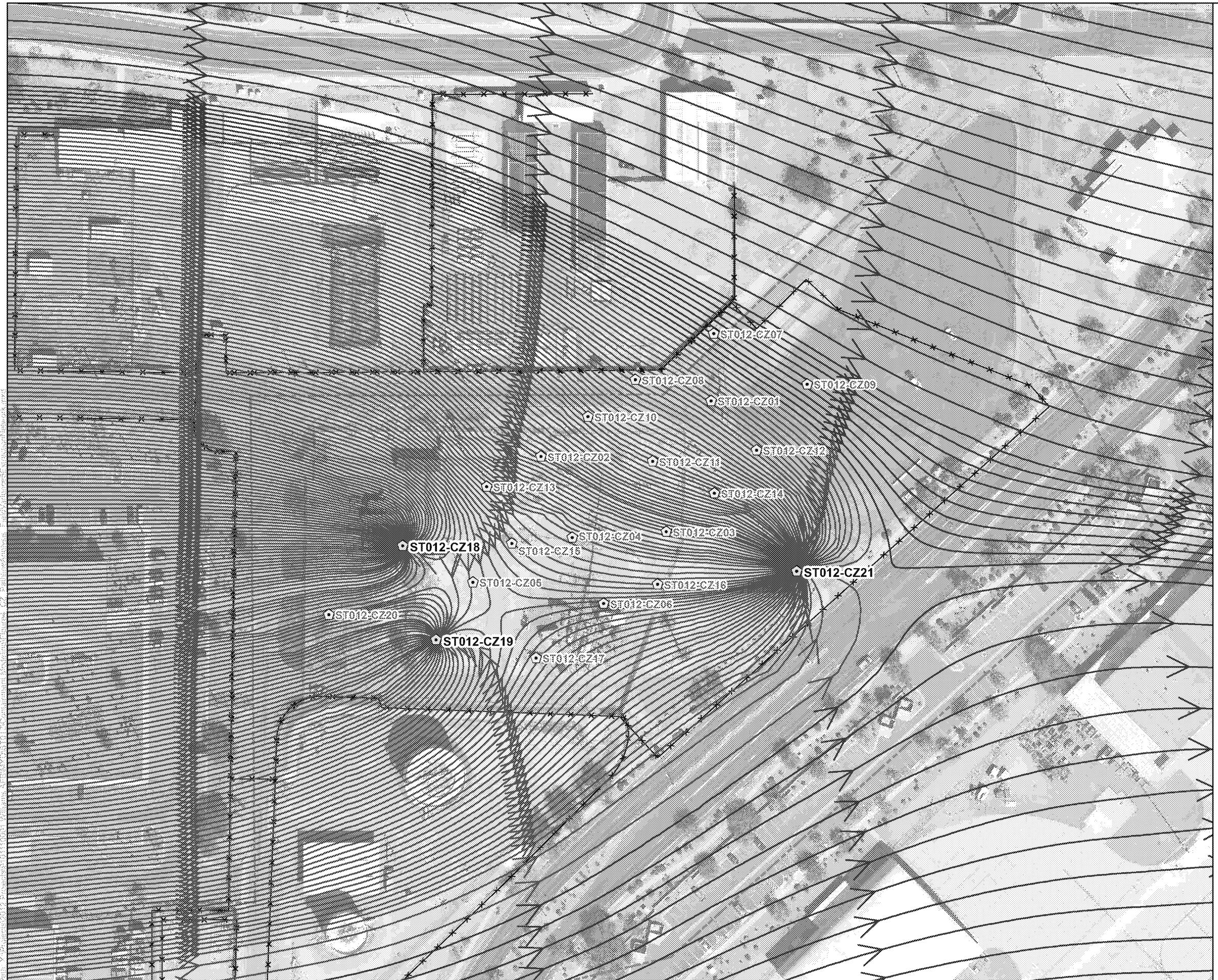
FIGURE 2	Job No.: 9101110001 PM: DS Date: 1/6/2017 Scale: 1" = 100'	
<p>The map shown here has been created with all due and reasonable care and is strictly for use with Amec Foster Wheeler Project Number 9101110001. This map has not been certified by a licensed land surveyor, and any third party use of this map, comes without warranty of any kind. Amec Foster Wheeler assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.</p>		



Site ST012 - Former Williams Air Force Base Mesa, Arizona	
Lower Saturated Zone Wells	
FIGURE 3	Job No.: 9101110001 PM: DS Date: 1/6/2017 Scale: 1" = 100'
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ATTACHMENT 3

CONTAINMENT EVALUATION FOR FVM5 EXTRACTION NETWORK

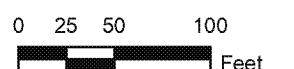


Legend

- Extraction Well Location
- Existing Well Location
- EBR Extraction Uncaptured Pathline
- EBR Extraction Captured Pathline
- Fence Line
- ST012 Site Boundary

Notes:

ST012-CZ23 Well Identification
EBR Enhanced Bioremediation

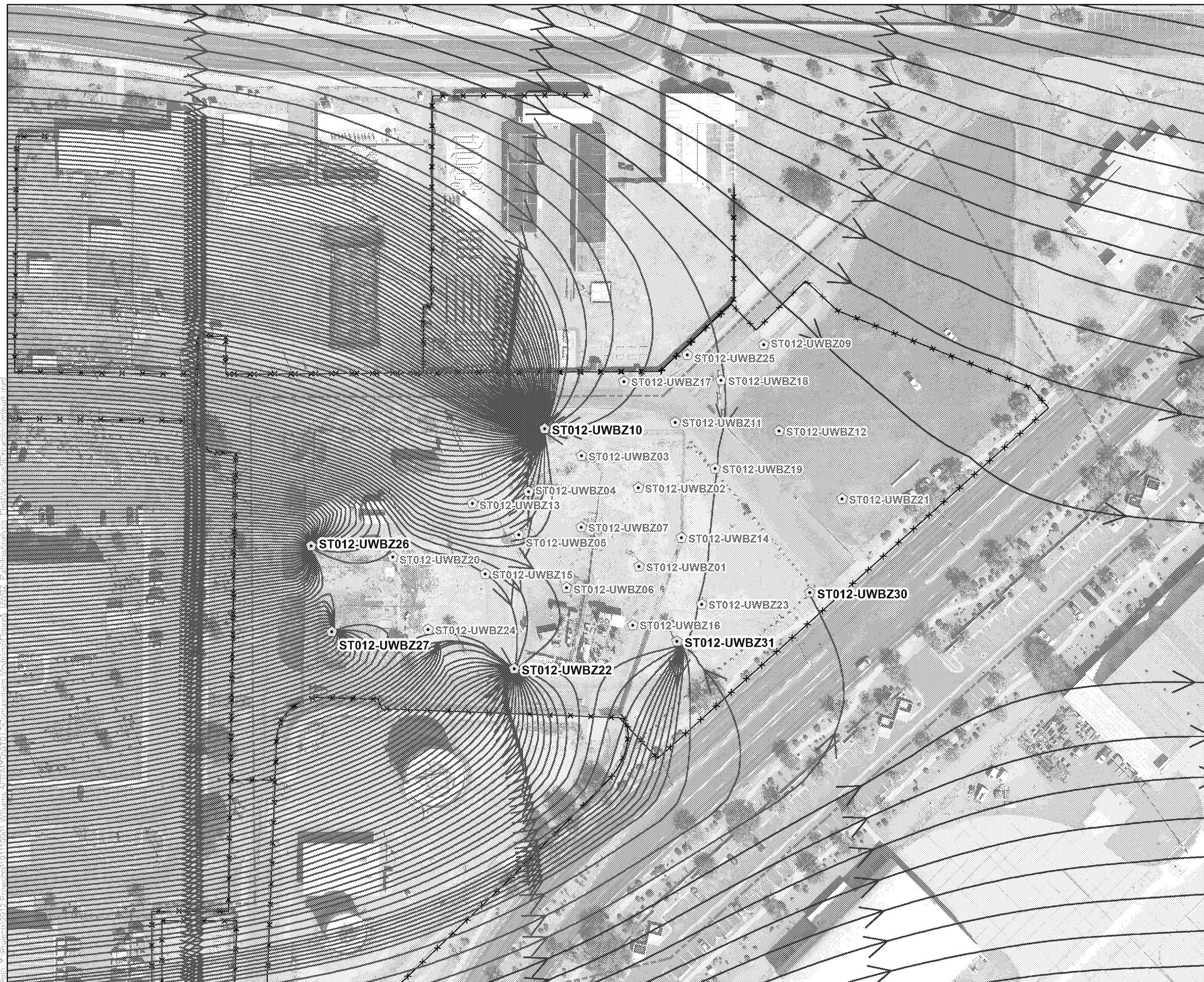


Site ST012 - Former Williams Air Force Base
Mesa, Arizona

Cobble Zone Pathline Analysis Field Variance 5 Extraction Network

FIGURE 4	Job No.: 9101110001 PM: DS Date: 1/6/2017 Scale: 1" = 100'	
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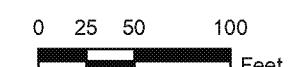
Legend

- Extraction Well Location
- Existing Well Location
- EBR Extraction Uncaptured Pathline
- EBR Extraction Captured Pathline
- Fence Line
- ST012 Site Boundary

Notes:

ST012-UWBZ12 Well Identification

EBR Enhanced Bioremediation

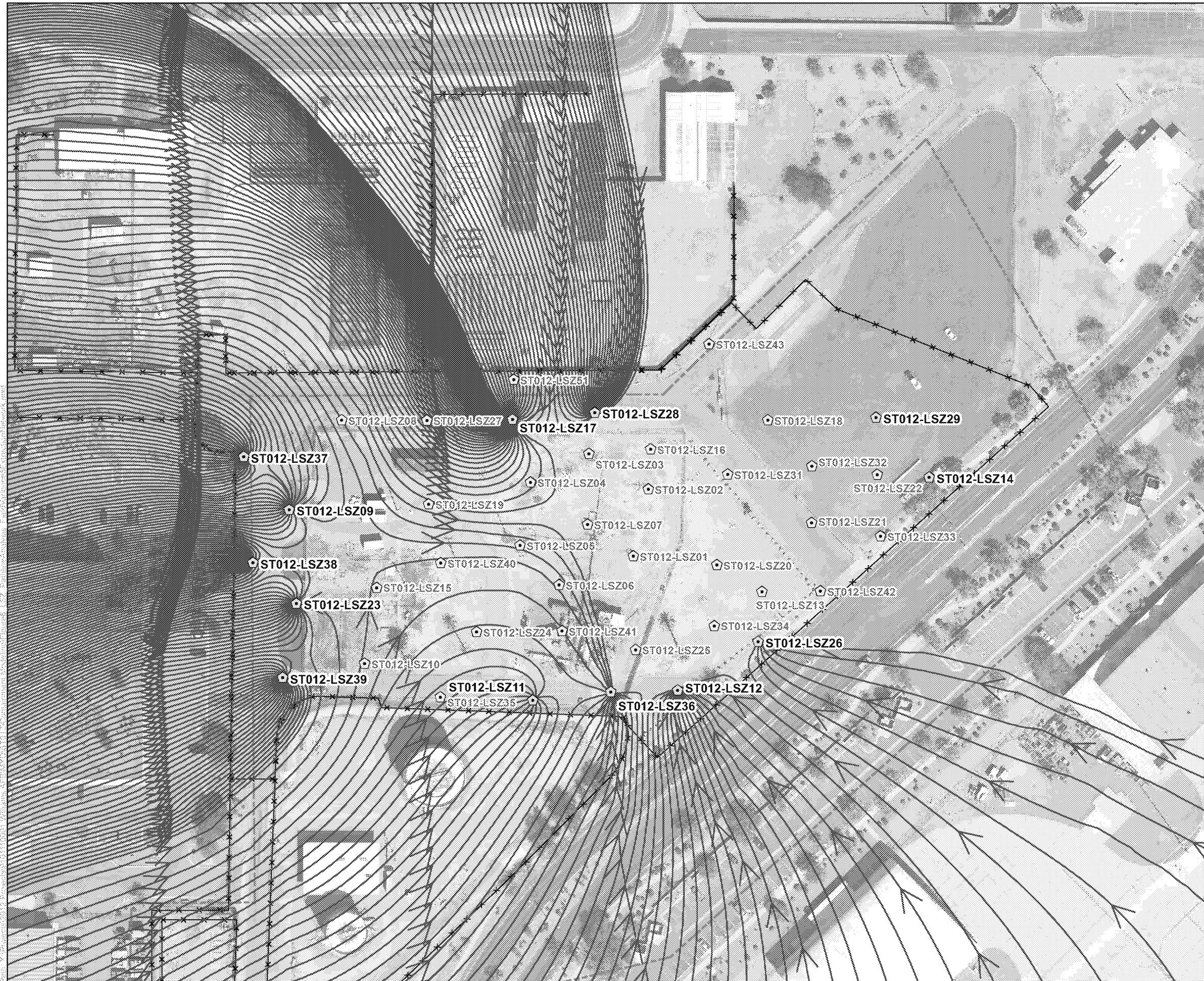


Site ST012 - Former Williams Air Force Base
Mesa, Arizona

Upper Water Bearing Zone Pathline Analysis
Field Variance 5 Extraction Network

FIGURE 5	Job No.: 9101110001 PM: DS Date: 1/20/2017 Scale: 1" = 100'	
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Legend

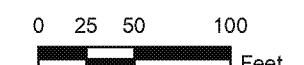
- Extraction Well Location
- Existing Well Location
- EBR Extraction Captured Pathline
- Fence Line
- ST012 Site Boundary

Notes:

ST012-LSZ45 Well Identification

EBR Enhanced Bioremediation

ST012-LSZ14 and ST012-LSZ29 do not receive pathlines originating from the western upgradient boundary of the model



Site ST012 - Former Williams Air Force Base
Mesa, Arizona

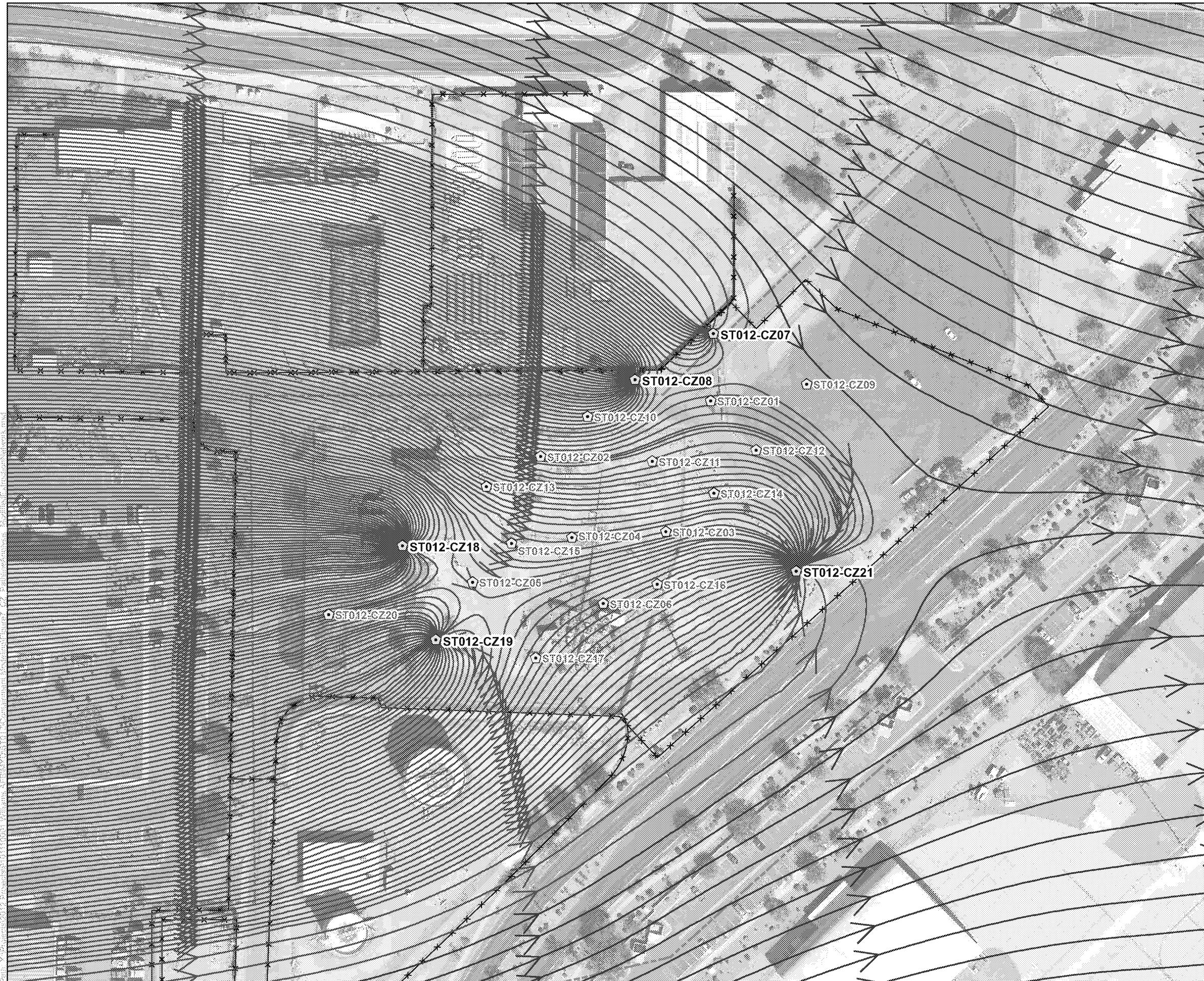
Lower Saturated Zone Pathline Analysis Field Variance 5 Extraction Network

FIGURE 6	Job No.: 9101110001 PM: DS Date: 1/6/2017 Scale: 1" = 100'	
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ATTACHMENT 4

CONTAINMENT EVALUATION FOR MODIFIED EXTRACTION NETWORK

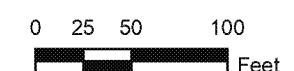


Legend

- Extraction Well Location
- Existing Well Location
- Active Containment Extraction Uncaptured Pathline
- Active Containment Extraction Captured Pathline
- Fence Line
- ST012 Site Boundary

Notes:

ST012-CZ23 Well Identification

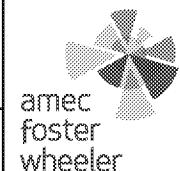


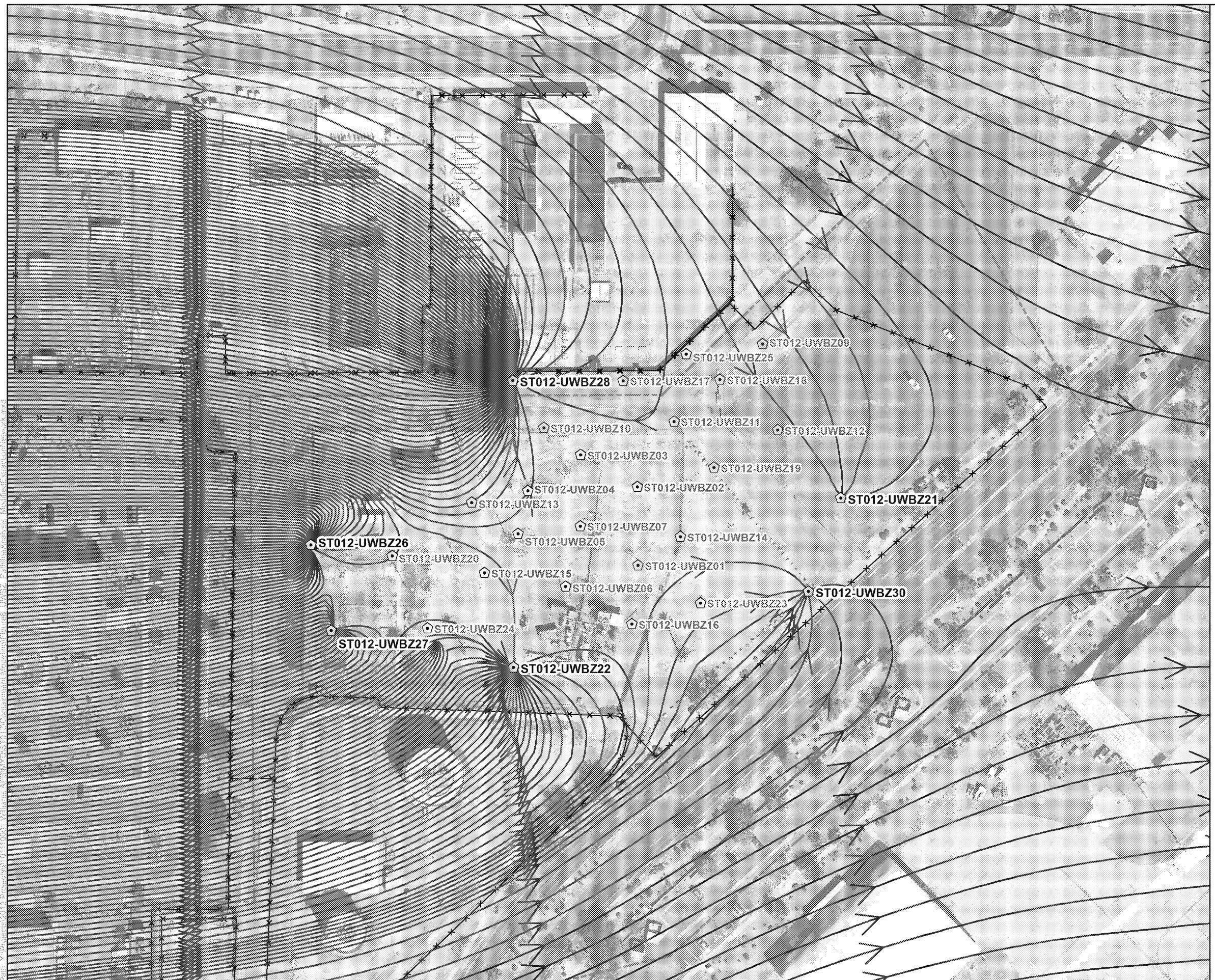
Site ST012 - Former Williams Air Force Base
Mesa, Arizona

Cobble Zone Pathline Analysis Modified Extraction Network

FIGURE 7	Job No.: 9101110001 PM: DS Date: 1/6/2017 Scale: 1" = 100'
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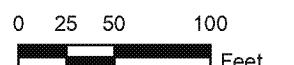


Legend

- Extraction Well Location
- Existing Well Location
- Active Containment Extraction Uncaptured Pathline
- Active Containment Extraction Captured Pathline
- Fence Line
- ST012 Site Boundary

Notes:

ST012-UWBZ12 Well Identification
EBR

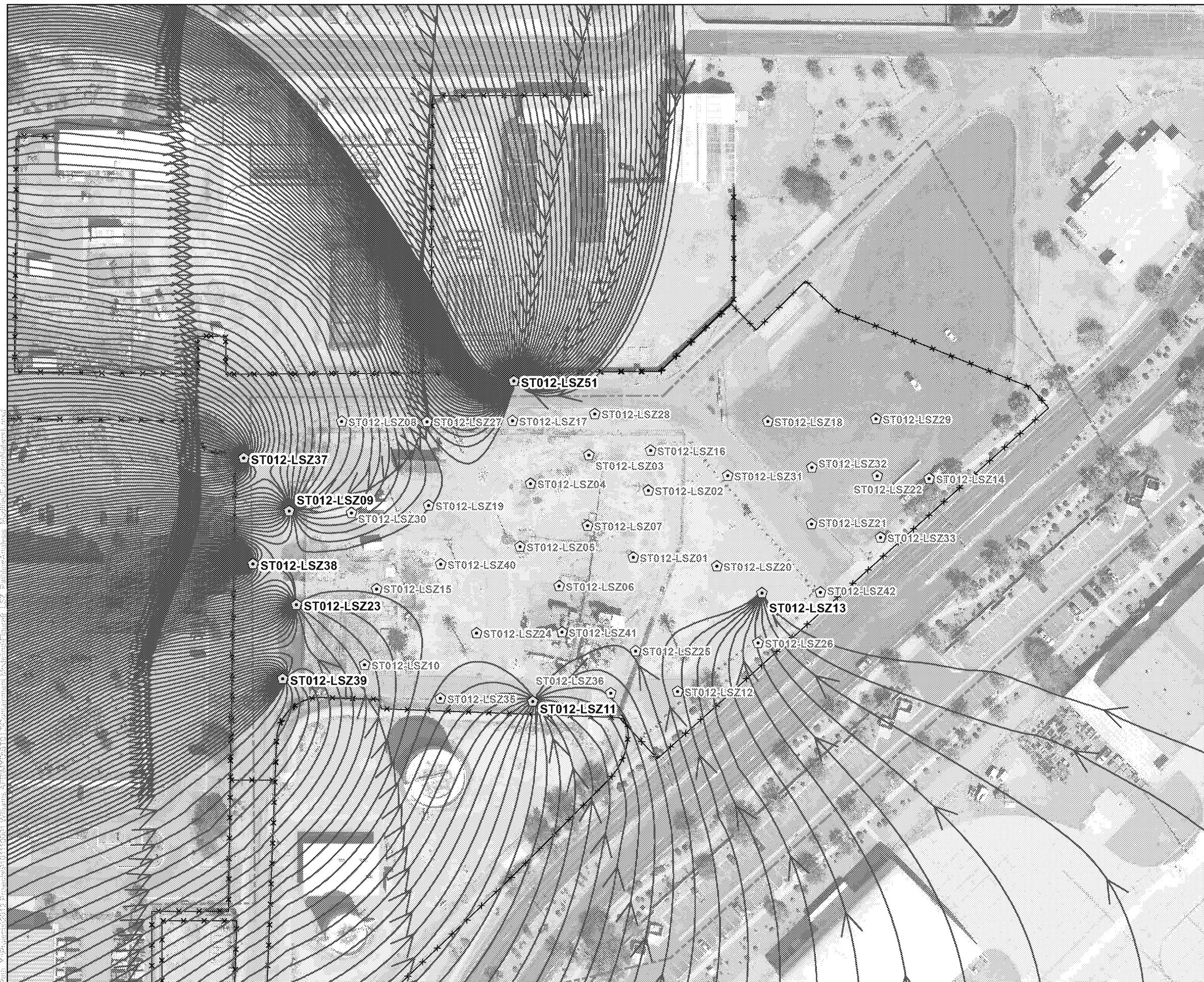


Site ST012 - Former Williams Air Force Base
Mesa, Arizona

Upper Water Bearing Zone Pathline Analysis Modified Extraction Network

FIGURE 8	Job No.: 9101110001 PM: DS Date: 1/6/2017 Scale: 1" = 100'	
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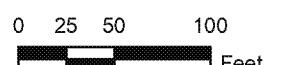


Legend

- Extraction Well Location
- Existing Well Location
- Active Containment Extraction Captured Pathline
- Fence Line
- ST012 Site Boundary

Notes:

ST012-LSZ45 Well Identification



Site ST012 - Former Williams Air Force Base
Mesa, Arizona

Lower Saturated Zone Pathline Analysis Modified Extraction Network

FIGURE 9	Job No.: 9101110001 PM: DS Date: 1/6/2017 Scale: 1" = 100'	
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